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**DRAFT MEMORANDUM
PRIVILEGED AND CONFIDENTIAL
PREPARED AT THE REQUEST OF COUNSEL**

TO: Garth Daley REF. NO.: 042192-05

FROM: Rick Hoekstra /Paul Gallaway/cnb/01 DATE: November 3, 2006

RE: **Proposed Cover Design
Resource Recovery Group/Clayton Chemical Company Site
Sauget, Illinois**

1.0 INTRODUCTION

Conestoga-Rovers & Associates Inc. (CRA) has prepared this memorandum to summarize the proposed cover design for the Resource Recovery Group/Clayton Chemical Company Site (Site).

2.0 COVER SYSTEM DESIGN

The proposed cover system for the RRG/Clayton Chemical Company Site will consist of a low permeability cover over the impacted area (see Drawing C-01). The purposes of the cover system include preventing direct soil contact; limiting the infiltration of rainfall and snowmelt through the existing soil profile, thereby minimizing the leaching potential of impacted subsurface soils; and serving as a vapor barrier for any volatile compounds in the soil matrix. In addition, the cover system will provide long-term protection against erosion and subsequent transport of contaminants. This section presents the basis for the design of the cover system and a description of the cover system design components. In general, the cover system will consist of a composite cap with vegetative surface.

The proposed cover system will cover approximately 1.6 acres of the RRG/ Clayton Chemical Company Site. The final grade of the cover will be approximately 3 to 4 feet above the current grade.

2.1 COVER SYSTEM COMPONENTS - VEGETATED COVER

The proposed cover system is a modified version of the RCRA Subtitle C cover that uses synthetic materials instead of soil materials to minimize the final elevation of the covered area. The components of the proposed modified RCRA Subtitle C cover system as presented in Drawing C-01 are as follows (from bottom to top):

- pre-grade layer (depth varies as necessary);
- soil barrier layer – compacted clay (min. 12 inches thick);
- geosynthetic clay liner (GCL);

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- 60-mil Linear Low Density Polyethylene Liner (LLDPE);
- geocomposite drainage layer (geonet);
- common fill (24 inches); and
- vegetative cover (6 inches).

The permeability of the overall cover system will be limited by the permeability of the 60-mil LLDPE liner. The specification can vary by manufacturer, but a permeability of 1×10^{-12} cm/sec should be expected. In addition, the expected permeability for the underlying GCL would be 5×10^{-9} cm/sec, while the compacted clay would have a required maximum in-place permeability of 1×10^{-7} cm/sec.

Overlying the impermeable layers of the cover system will be a manufactured geocomposite drainage layer to ensure adequate drainage of the infiltrating precipitation that is contained above the barrier layers. The minimum required transmissivity of the drainage material is expected to be approximately 1×10^{-3} m²/sec.

The final vegetated cover is expected to incorporate the use of wildflower grasses to reduce surface water drainage, maintain erosion control, and reduce the long-term maintenance of the cover system (i.e., reduced frequency of grass cutting).

2.2 COVER SYSTEM DRAINAGE

The Site is currently drained by sheeting of surface water flow of the Site to an off-Site drainage ditch along the east side of the Site. Drainage of surface water runoff from the cover system cannot be fully evaluated without a full topographic survey of the area to be covered, however it would be anticipated that the final cover design would attempt to maintain the current sheet flow drainage pattern to the eastern ditch.

The general approach would be to use the natural drainage of the Site (simply elevated by the 36-inch cover thickness) to maintain the existing drainage. However, in specific areas of the Site where localized drainage is not effective, or where the natural slopes are less than the typical minimum of 3 percent, the thickness of the cover system may be varied to more adequately promote surface water drainage. As part of the overall cover system design, it may be necessary to tie the geonet into a rip-rap drainage apron around the edge of the cover to allow the collected water to discharge to the adjacent ground surface. Where surface drainage is not adequate to remove all accumulated surface water, it may be necessary to construct a small drainage ditch to direct water to the existing ditch east of the Site.

3.0 IMPLEMENTATION SCHEDULE

Prior to construction, a detailed work plan will be submitted for approval. Installation of the impermeable cover requires good weather for installation. Pending completion and approval of the work plan, it is estimated the final cover installation should be completed in approximately one month under fair weather conditions. The earliest recommended construction start time to avoid protracted construction delays due to inclement weather conditions would be in the spring of 2007.